ARPA-E's 37 Projects Selected From Funding Opportunity Announcement #1

Project Title:	High Energy Density Lithium Batteries
Organization:	Envia Systems
Funding Amount:	$4,000,000
Website:	www.EnviaSystems.com

Brief Description of Project

Envia Systems, in partnership with Argonne National Laboratory, will use a Systems based solution to develop advanced high capacity silicon-carbon nanocomposite anodes, discover and engineer complementary high capacity cathodes, and integrate them to produce the world's highest energy density lithium ion batteries with energy density of over 400 Wh/kg. Envia will also develop processes to scale the production of both anode and cathode materials to high volumes. Scaling of the materials will involve reproducibility of materials not only with high performance but also with high quality and consistency.

This transformational technology has the potential to exceed the technical specifications for hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs) and pure electric vehicles (EVs), making the U.S. a dominant player in the global battery market as well as enabling the economic penetration of more fuel efficient vehicles into the mainstream. This technology will aid in reducing U.S. dependence on foreign oil, reducing negative carbon emissions, increasing energy efficiency, and increasing domestic production of energy storage products. Successful advancement of this technology will drive each of the ARPA-E Mission Areas.

Why ARPA-E Funding and Not Private Capital

Envia Systems is a young company with limited financial resources. Envia is focused on creating a paradigm shift in the high energy density anode and cathode materials used in lithium ion batteries for Electric Vehicles. But because of the high risk nature of this specific project, private sources of funding are difficult to obtain. Without ARPA-E funding, it is likely that this project will not be initiated in a timely manner.

Uniqueness/Benefits of Technology

Upon integration of both anode and cathode materials into commercial format lithium ion batteries, the expected energy density achieved is >400Wh/Kg which is 3x greater than what is available currently used in transportation applications. Current battery costs to make electric vehicles are too high. Because this technology provides much more energy per battery, overall battery costs to the vehicle maker can be reduced by 50%, which will truly make PHEVs available to the mass markets.

Addressable Market & Potential Customers

There is an overwhelming need for low cost and light weight energy storage systems for transportation applications such as hybrid-electric-vehicles (HEVs), plug-in-hybrid electric vehicles (PHEVs) and pure electric vehicles (EVs). U.S. Automakers such as General Motors and Ford have very initiated programs for these applications. It is projected that by the year 2020, the lithium battery market needed for these applications will be in excess of $30 billion.

For inquiries, contact:

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Key Team Member Bios

Dr. Herman Lopez, *Director of Materials Development, Envia Systems*
-Formerly at Intel
Dr. Sujeet Kumar, *Co-Founder & CTO, Envia Systems*
-Formerly at Wilson Greatbatch
Dr. Subramanian Venkatachalam, *Senior Scientist, Envia Systems*
-Formerly at the University of Delaware
Dr. Khalil Amine, *Senior Scientist and Manager of the Advanced Lithium Battery Technology Group, Argonne National Laboratory*
-Formerly at Japan Storage Battery Company
Michael Sinkula, *Co-Founder and Director, Envia Systems*
-Formerly at Hewlett Packard

Miscellaneous

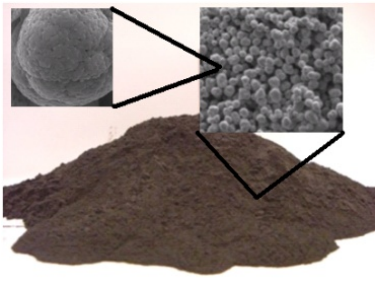
The lithium battery industry has traditionally progressed very slowly, with annual performance on the order of 5%. With the 2x-3x improvement that Envia's technology offers, there is a clear opportunity to have a large competitive advantage. In addition to the automotive market, numerous applications value high energy density batteries including consumer electronics and military applications.

Testimonials

"Envia is very thankful to receive support from ARPA-E. The ARPA-E team has been very efficient and diligent in enabling Envia's transformational technology. It is only with the incredible support from ARPA-E that we can robustly accelerate development of this technology so that it can meet the demands of next generation vehicles. These new vehicles will have a critical role to play in achieving future fuel efficiency standards. Without ARPA-E funding and the acceleration it affords, it is quite possible that this window of opportunity for technology adoption will be missed. This project presents an opportunity for a U.S. based company to leap ahead of the rest of the world in lithium battery technology."
-Michael Sinkula, Co-Founder & Director, Envia Systems

Schematics/Photos of Technology or Personnel

Envia's electrode powder (in bulk and as particles) and its pouch cell battery



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